

Management Strategies During Pregnancy to Prevent Neonatal Herpes:
An Educational Intervention for Health Care Providers

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Abstract

Neonatal herpes is a significant yet preventable outcome of genital herpes exposure.

Approximately 1,500-2,000 new cases of neonatal herpes infection are diagnosed annually (Ural & Cheng Peng, 2013). The purpose of this project is to increase the knowledge of health care professionals about genital herpes and its prevention, so that the general public can become better informed. Ultimately, the hope is that by increasing the general public's awareness about genital herpes and its prevention, genital herpes acquisition in pregnancy will be decreased, thus reducing cases of neonatal herpes. The educational intervention Neonatal Herpes Prevention: Management Strategies During Pregnancy combines lecture and interactive formats and is intended for use during an educational meeting. The envisioned use for the educational intervention is a continuing education course, specifically among health care professionals caring for pregnant women or women of childbearing age. The literature suggests that in-person educational meetings, web-based educational modules, and printed educational materials are all effective at improving professional practice among health care providers. Thus, the educational content is designed for adaptation to various educational methods in order to meet the diverse educational needs and learning style preferences of health care providers. The anticipated outcome is a reduction in occurrences of neonatal herpes as a result of increased awareness among providers, patients and the general public, behavioral changes regarding sex practices, and improved management of genital herpes.

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The risk of maternal transmission of herpes simplex virus (HSV) to the newborn is a significant health concern. One in five American women is infected with the herpes virus and about 2% of women acquire genital herpes during pregnancy (Ural & Cheng Peng, 2013; Wood, 2011). Neonatal transmission is highest among women who are seronegative because there is not adequate time to develop antibodies needed to suppress viral replication prior to labor (Straface, 2012; Ural & Cheng Peng, 2013). Therefore, the possibility of transmission to the neonate is highest (30-50%) among pregnant women who acquire genital herpes close to the time of delivery (Centers for Disease Control and Prevention [CDC], 2011b). Among women acquiring genital herpes during pregnancy, two-thirds remain asymptomatic and have no symptoms suggestive of a genital herpes infection (Kimberlin & Baley, 2013). Furthermore, 60% to 80% of women who deliver a baby infected with herpes have neither a past history of infection nor a sexual partner reporting a history (Kimberlin & Baley, 2013). This considerable risk of unknown genital herpes transmission from the pregnant mother to the neonate indicates a need for preventive action.

The Current Situation

Neonatal HSV is defined as infection in a newborn in the first 28 days of life (Corey & Wald, 2009). The frequency of neonatal herpes is estimated to be about 10-60 cases per 100,000 live births in the United States (U.S.) (Jaiyeoba, Amaya, Soper, & Kilby, 2012). Untreated neonatal HSV infection is associated with a mortality rate of 60%, and even with prompt treatment, survivors experience great disability (Ural & Cheng Peng, 2013). Severe cases can lead to lifelong complications; thus, prevention is the basis for decreasing the negative effects of

herpes in the neonate (Woods, 2011). Prevention of neonatal herpes depends on preventing initial acquisition of genital herpes infection during late pregnancy, recognizing asymptomatic infections, and avoiding exposure of the infant to herpetic lesions during delivery (CDC, 2011b; Ural & Cheng Peng, 2013).

In the framework of childbirth, the risks of genital herpes are frequently misunderstood (Kriebs, 2008). Studies conducted by Handsfield, Stone, and Graber (1998), and Romanowski, Zdanowicz, and Owens (2008) found that knowledge regarding genital herpes was low among health care providers and those with herpes themselves. Hence, many infected persons and their sex partners, as well as others at risk, were receiving suboptimal and insufficient health care information and prevention guidance (Handsfield et al., 1998). Education and counseling for women without known genital herpes, as well as for those known to be infected and their sex partners, are recognized as key components in the prevention of sexual and perinatal transmission of HSV (Glass, Nelson, & Huffman, 2005). This highlights a need for educational efforts aimed at health care providers. By equipping health care professionals with the knowledge necessary to educate and counsel patients, the general public will become better informed about genital herpes and its prevention in order to minimize transmission of HSV.

Background

In order to fully understand the problem of genital herpes and its effect on pregnancy and childbirth, background information is included about HSV, including transmission, clinical manifestations, infection statuses, risk factors, diagnostic testing, and antiviral therapy. To allow for a better understanding of the disease's implications on the expectant woman and neonate, material regarding HSV during pregnancy and neonatal herpes is also presented.

Herpes Simplex Virus (HSV)

The HSVs, herpes simplex virus type 1 (HSV-1) and herpes simplex virus type 2 (HSV-2), members of a broad group of DNA viruses, are transferred across epithelial mucosal cells and skin breaks, migrating to nerve tissues where they lie dormant in a latent stage (Kriebs, 2008). This latent stage allows the virus to cause disease reoccurrences of varying severity over the entirety of an individual's life (Jaiyeoba et al., 2012). HSV-1 infections prevail in orofacial lesions, typically located in the trigeminal ganglia (Kriebs, 2008). Hence, HSV-1 is a common chronic infection that is the cause of most oral herpes, or cold sores (CDC, 2011a). On the other hand, HSV-2 infection is usually found in the lumbosacral ganglia (Kriebs, 2008). Nonetheless, either virus can infect any region of the body, meaning HSV-1 and HSV-2 can both cause genital herpes (Kriebs, 2008).

There is no cure for HSV and living with herpes can be a difficult adjustment (Office on Women's Health, United States Department of Health and Human Services [HHS], 2009; ACOG, n.d.). Different from other incurable diseases, HSV is not typically linked to a long-term deterioration in health (Kriebs, 2008). However, a new HSV diagnosis frequently creates stress, embarrassment, and concerns about future sexual encounters as well as the safety of childbearing (Kriebs, 2008).

Transmission and clinical manifestations. HSV is spread through direct contact with lesions, typically during sexual activity (Kriebs, 2008; ACOG, n.d.). Lesions may appear 2-14 days after exposure and may persist for 2-4 weeks without antiviral therapy (Glass et al., 2005; ACOG, n.d.). Lesions present as small, tender, fluid-filled vesicles on the genitals, buttocks, or other areas (Glass et al., 2005). Other symptoms may include intense pain, dysuria, itching, lymphadenopathy, fever, headache, nausea, malaise, and myalgia (Glass et al., 2005). While lesions heal in days or weeks, the virus remains in the body (ACOG, n.d.). Transmission can also

occur when a sore is not present, known as asymptomatic viral shedding, because intermittent viral reactivation occurs both during periods of active outbreaks and when no symptoms are present (Kriebs, 2008; ACOG, n.d.). There is a high possibility that HSV-infected individuals are unaware of their diagnosis because up to 70% of heterosexual transmission happens during periods of asymptomatic shedding (Kriebs, 2008).

Infection status. Three statuses of infection exist for HSV, classified as primary, non-primary first-episode, and recurrent infection.

Primary infection. Primary infection occurs when an individual is initially exposed to HSV and antibodies do not exist at the time of infection (Glass et al., 2005). Nearly 75% of people with primary infection are asymptomatic (Glass et al., 2005). This is the most significant HSV infection when considering pregnancy as rates of neonatal herpes may be as high as 50% (Anzivino et al., 2009; Kriebs, 2008).

Non-primary first-episode infection. Non-primary first-episode infection occurs when an individual with preexisting antibodies to either HSV-1 or HSV-2 experiences a first episode with the opposite HSV type (Straface et al., 2012).

Recurrent infection. Recurrent infections occur in someone with preexisting antibodies against the same HSV type and may be symptomatic or asymptomatic (Glass et al., 2005; Straface et al., 2012). Antibodies to HSV do not prevent recurrences (Glass et al., 2005). When symptoms occur, they are typically localized with lesions present for roughly seven days (Glass et al., 2005). An outbreak is often preceded by a prodrome when an individual may feel pain in the lower back, buttocks, thighs, or knees (ACOG, n.d.). Recurrent infections are associated with only a 3% risk of neonatal herpes because transplacental antibodies significantly decrease the risk of transmission (Jaiyeoba et al., 2012; Kriebs, 2008).

Risk factors. The HSV-2 antibody is closely linked to female gender, years of sexual activity, number of lifetime sexual partners, and past infection with STDs (Glass et al., 2005). The prevalence of HSV infection rises with age, reaching its maximum around 40 years of age (Straface et al., 2012). Such high rates among adults in that age group can be attributed to the chronic nature of the virus as well as fluctuating sexual relationships over time (Kriebs, 2008). There is minimal risk of infection from a single sexual encounter, so when a partner is infected, longer-term relationships increase the potential for heterosexual transmission (Kriebs, 2008). Additional independent predictors of HSV-2 infection include less education (defined by last year of education completed), lower-income, and the use of cocaine (Glass et al., 2005).

Diagnostic testing. Diagnostic testing options for HSV include polymerase chain reaction, viral culture, and serology blood testing.

Polymerase chain reaction. Polymerase chain reaction (PCR) is a molecular test that examines the patient's blood for pieces of the virus' DNA (WebMD, 2014). This test is able to identify viral shedding in the presence or absence of lesions (Kriebs, 2008). When available, this detection method should be considered because of its speed, accuracy, and ability to distinguish HSV-1 from HSV-2 (American Sexual Health Association [ASHA], 2014b).

Viral culture. Viral culture relies on fluid collected from intact blisters and is most accurate early in the sequence of clinical outbreak (Kriebs, 2008). A culture should be obtained within the first 48 hours after a lesion appears (ASHA, 2014b). Results are typically available within a week of the culture date (ASHA, 2014b).

Serology blood testing. Serology blood tests are able to detect previous HSV-1 or HSV-2 infection in asymptomatic individuals, or diagnose symptomatic individuals when a culture is not possible or the clinical syndrome is indistinct (Glass et al., 2005). Serology testing identifies

prior exposure through the presence of antibodies, but is unable to determine the onset of infection or pinpoint the locus of shedding (Kriebs, 2008).

Antiviral therapy. Acyclovir, famciclovir, and valacyclovir have been approved for the treatment of genital herpes (Glass et al., 2005). These drugs act by inhibiting viral replication in cells infected with HSV, minimizing the length of an outbreak (Glass et al., 2005; ACOG, n.d.). Daily medication use can significantly decrease the risk of transmission in individuals experiencing frequent outbreaks (ACOG, n.d.). Primary herpes infections require a prolonged treatment regimen because antibodies that normally help to reduce symptoms have not yet been established (Kriebs, 2008). In this case, a 10-day course of oral antiviral medication is suggested (Kriebs, 2008). A shorter course of antiviral medication is warranted for recurrent infections (Kriebs, 2008).

Herpes Simplex Virus in Pregnancy

Genital herpes during pregnancy has significant implications for the pregnant woman and, thus, the neonate. Initial acquisition during pregnancy, or primary infection, is less prevalent than recurrent infection, yet primary infection has a significantly higher transmission rate (USPSTF, 2005b). This is important because, during pregnancy, primary infection poses greater threats to both mother and infant than recurrent infection, regardless of the presence of symptoms (Kriebs, 2008). Primary infections in the first trimester are related to higher rates of spontaneous abortion and stillbirth, while infections acquired later in pregnancy may result in premature birth and an infant with low birth weight (Perinatology, n.d.). Additionally, the majority of infants who acquire neonatal herpes are born to asymptomatic mothers lacking histories of clinically evident genital herpes (CDC, 2011b). Among all asymptomatic women discovered to be shedding HSV at the time of delivery with no known history of genital herpes,

about one-third have a primary infection and are thus at an increased risk of transmitting infection to the neonate (Jaiyeoba et al., 2012). Hence, in order to prevent neonatal herpes, it is essential to prevent acquisition of primary infection during pregnancy, as well as transmission to the neonate from women experiencing asymptomatic infection.

Risk factors. Maternal age of 21 years and younger is associated with a high risk for vertical transmission (Ural & Cheng Peng, 2013). Similarly, uninfected women in serodiscordant relationships, where the partner is infected yet the woman remains uninfected, are at high risk for mother-to-child transmission (Kriebs, 2008). During pregnancy, a partner's history of oral herpes has been associated with an increased risk of a seronegative woman acquiring HSV-1; though having a new partner within the past year has been linked to HSV-2 acquisition (Kriebs, 2008).

Neonatal Herpes Simplex Virus

It is imperative to have an understanding of neonatal HSV and its severity in order to recognize the importance of its prevention. Manifestations of the herpes virus in the neonate range from mild localized disease to severe disseminated infection (USPSTF, 2005b). Delayed diagnosis is associated with high mortality and even with adequate treatment, permanent consequences including cerebral palsy and developmental delays may occur (Jaiyeoba et al., 2012). The overall death rate from untreated neonatal herpes is 65% (Jaiyeoba et al., 2012). This emphasizes that prevention and early recognition of exposure are of extreme importance in reducing the morbidity and mortality associated with neonatal HSV (Jaiyeoba et al., 2012).

Neonatal transmission. The herpes infection may be transmitted from the pregnant woman to the infant before, during, or after delivery, otherwise known as intrauterine, intrapartum, and postnatal transmission (Ural & Cheng Peng, 2013).

Intrauterine. Intrauterine, also known as congenital, infections are very rare (1/100,000) due to the acquisition of the virus in utero (Straface et al., 2012). Intrauterine infections occur without the baby passing through the vagina, such as if the amniotic sac breaks a few hours before birth (ACOG, n.d.; USPSTF, 2005b). Congenital infection is distinguished from neonatal HSV infection based on the appearance of lesions, with neonatal herpes lesions becoming apparent more than 48 hours after birth (Straface et al., 2012). Intrauterine transmission has been known to occur in pregnant women who develop disseminated HSV infections (Straface et al., 2012). According to Straface et al. (2012), in utero transmission is most likely during the first 20 weeks of gestation, and results in abortion, stillbirth, and congenital anomalies.

Intrapartum. Intrapartum transmission accounts for the majority of neonatal infections (Ural & Cheng Peng, 2013). Risk is lessened when protective maternal antibodies cross from mother to neonate and exist in the fetus (Ural & Cheng Peng, 2013). Hence, when the mother acquires a primary infection, transmission rate is 50%, compared to a transmission rate of 33% with non-primary first-episode infection, and a transmission rate of 0-4% with recurrent infection (Ural & Cheng Peng, 2013). Among intrapartum infections, 80% occur in women who have no reported history of infection (Horsley, 2008).

Postnatal. Postnatal transmission accounts for 5-10% of neonatal HSV infections and occurs through infant contact with infected parents or health care providers (Straface et al., 2012; Ural & Cheng Peng, 2013). For example, although HSV is not passed to the baby through breast milk, it is possible for the infant to become infected by touching a lesion located on the mother's breast (ACOG, n.d.).

Types of neonatal infection. Three types of neonatal HSV infection acquired during the intrapartum or postpartum period have been identified (Kimberlin & Baley, 2013).

Disease localized to the skin, eyes, and mouth (SEM). The most prevalent (45%) and nonthreatening type of neonatal herpes infection is disease localized to the skin, eyes, and mouth (SEM) (Ural & Cheng Peng, 2013). This type is characterized by vesicular lesions isolated to the skin, eye, and mucosal areas (Jaiyeoba et al., 2012). Serious SEM infections may lead to death or long-term central nervous system (CNS) morbidity, but the majority of affected infants do not have CNS or multiple organ involvement and therefore have more favorable long-term outcomes if treatment is not delayed (Jaiyeoba et al., 2012; Ural & Cheng Peng, 2013).

Encephalitis with or without SEM involvement. The second type, referred to as encephalitis with or without SEM involvement, also called CNS disease, affects about 30% of infants who acquire neonatal HSV. CNS disease is associated with a worse prognosis (Jaiyeoba et al., 2012).

Disseminated disease. Disseminated disease, which affects 25% of infants with neonatal herpes, involves numerous organs, including the CNS, lungs, liver, adrenal, and/or SEM, and is associated with the highest mortality rate of over 50% even with treatment (Glass et al., 2005; Kriebs, 2008). Infants who survive often suffer from significant neurologic deficits, blindness, seizures, and learning disabilities (Kriebs, 2008).

Review of Literature

A variety of strategies exist to prevent and manage genital herpes infection during pregnancy in order to avoid the outcome of neonatal herpes. These strategies include assessment, screening, antiviral therapy, cesarean delivery, and education and counseling. However, numerous features of HSV infections, including high prevalence among pregnant women yet rare perinatal transmission, unpredictable relapses, and the likelihood of undiagnosed, asymptomatic infections, make prevention of neonatal transmission a challenge (Jaiyeoba et al., 2012).

Assessment

All women should be assessed for a history of HSV infection early in pregnancy (Money & Steben, 2008; USPSTF, 2005b). A woman's partner history should also be evaluated at the first prenatal visit (Straface et al., 2012). Women with a history of genital herpes should be asked about recent symptoms and should also have a perineum examination performed prior to delivery (USPSTF, 2005b). This includes a careful inspection of the vulva, vagina, and cervix while avoiding artificial rupture of membranes (Anzivino et al., 2009). Similarly, the CDC (2011b) suggests that at the onset of labor all women are both questioned regarding symptoms of genital herpes, including prodromal symptoms, and examined for herpetic lesions. Nonetheless, screening via assessment and physical examination alone is unreliable because viral shedding without clinically visible genital lesions is common (Jaiyeoba et al., 2012). Although this remains the focus of clinical practice, it has not reduced the incidence of neonatal herpes because detection of HSV in the genital tract at the time of delivery is a more significant finding than any prior history (Jaiyeoba et al., 2012).

Screening

"There is no recommendation for universal screening for HSV during pregnancy" (Kriebs, 2008, p. 206). The U.S. Preventive Services Task Force (USPSTF, 2005a) "recommends against routine serological screening for herpes simplex virus (HSV) in asymptomatic pregnant women at any point during pregnancy to prevent neonatal HSV infection." Fair evidence was found that screening asymptomatic pregnant women does not reduce transmission of HSV to newborns (USPSTF, 2005b). Women developing primary infection during pregnancy, with the highest risk of transmitting infection to the neonate, are initially seronegative (USPSTF, 2005b). Thus, serology screening tests for HSV do not

accurately detect those at highest risk for mother-to-baby transmission (USPSTF, 2005b). ACOG (2007) also does not recommend routine screening of pregnant women, including asymptomatic women with recurrent disease. The CDC (2011c) agrees that if no lesions are present during the third trimester in pregnant women with a history of recurrent infection, routine cultures are not indicated.

However, the CDC (2013b) does recommend testing pregnant women, at any time during pregnancy, who present with symptoms or have a partner with genital herpes or symptoms indicative of genital herpes. Kimberlin and Baley (2013) and Jaiyeoba et al. (2012) suggest that women in labor with visible genital lesions indicative of HSV undergo type-specific serology testing through HSV PCR, and viral culture. Straface et al. (2012) and Anzivino et al. (2009) recommend sequential viral cultures on genital secretions beginning at 32 weeks gestation when a primary infection is acquired during the first two trimesters. Thus, screening for HSV has implications during pregnancy in symptomatic women, women with symptomatic partners, and among women acquiring primary infection early in pregnancy. On the contrary, screening alone is not likely to be successful at preventing neonatal herpes since it is unable to accurately identify those at highest risk of transmitting infection to the neonate.

Antiviral Therapy

Antiviral therapy, including acyclovir, valacyclovir, and famciclovir, is indicated for individuals with genital herpes infection to reduce the length of recurrences and suppress viral shedding, thus reducing transmission risk (CDC, 2011b; ACOG, n.d.). This is significant for pregnant women with genital herpes infection in order to prevent neonatal herpes.

Recommendations have been made regarding the use of antiviral therapy in pregnant women

based on infection status. These recommendations and the safety of antiviral therapy during pregnancy are discussed in this section.

Primary infection during pregnancy. At the time of initial outbreak, antiviral therapy should be administered orally to pregnant women to decrease the duration and severity of symptoms and to minimize the occurrence of viral shedding (ACOG, 2007). Jaiyeoba et al. (2012) also recommend that all women with confirmed primary infection receive antiviral therapy regardless of the time of manifestation during pregnancy. Intravenous acyclovir is suggested for pregnant women with severe genital infections or with disseminated herpetic infections (ACOG, 2007). However, due to the commonality of asymptomatic primary infections acquired during pregnancy, antiviral therapy may not have useful implications for this population.

Recurrent infection during pregnancy. In adults and adolescents with recurrent infection, systemic antiviral therapy effectively decreases viral shedding and recurrences of genital herpes and is recommended to prevent transmission of HSV (Kriebs, 2008; USPSTF, 2005b). ACOG's (2007) guidelines suggest the use of acyclovir and valacyclovir at 36 weeks' gestation until delivery in women with active recurrent infection to prevent neonatal herpes. Kriebs (2008) and Money and Steben (2008) add that suppressive antiviral therapy, acyclovir or valacyclovir, beginning at 36 weeks' gestation decreases the risk of herpetic lesions and viral shedding near term, decreases the need for cesarean delivery, and reduces cases of neonatal infection, even in women who have not had clinical outbreaks during pregnancy. Straface et al. (2012) and Anzivino et al. (2009) agree with the recommendation for acyclovir or valacyclovir treatment from 36 weeks' gestation until term to reduce the potential for future clinical manifestations and vertical transmission, and to eliminate the virus during delivery. Still,

Kimberlin and Baley (2013) suggest that viral shedding is only reduced, not eliminated, and thus occurrences of neonatal herpes have been recently reported in infants born to women who were receiving suppressive antiviral therapy. Similarly, the USPSTF (2005b) has found no evidence at this time that antiviral therapy use in women with a history of HSV decreases the incidence of neonatal infection. Additionally, the CDC (2011b) suggests that the effectiveness of antiviral therapy use during late pregnancy to reduce neonatal herpes infections is unknown.

Safety during pregnancy. USPSTF has found that there is insufficient evidence regarding the safety of acyclovir use during pregnancy (Glass et al., 2005). The CDC (2011b) agrees that the safety of systemic acyclovir, valacyclovir, and famciclovir during pregnancy has not yet been established. However, an increased risk for major birth defects was not found in pregnant women being treated with acyclovir during the first trimester compared to the general population (CDC, 2011b). Hence, acyclovir may be administered orally to pregnant women with primary HSV infection or severe recurrent infection, and may be administered intravenously to those with severe infection (CDC, 2011b). The data pertaining to prenatal exposure to valacyclovir and famciclovir is scant and thus does not provide useful information on pregnancy outcomes (CDC, 2011b). Nonetheless, all three antiviral therapy drugs, acyclovir, valacyclovir, and famciclovir, have been labeled category B drugs suggesting that no teratogenic effects were discovered in animal studies, although no or limited studies on humans are available (Ural & Cheng Peng, 2013).

Cesarean Delivery

Cesarean delivery is an option for pregnant women with genital herpes. Recommendations have been made for pregnant women with active genital herpes infection and for women with a history of the disease but who are asymptomatic at the time of delivery.

Active infection. The CDC (2011b) identifies cesarean delivery as the current standard among pregnant women who have active genital HSV lesions or early symptoms, such as vulvar pain and itching, at the time of delivery. Although cesarean delivery will not completely eliminate the potential for transmission of HSV to the infant, women with genital herpes lesions at the time of delivery should undergo a cesarean delivery in order to minimize the possibility for transmission (CDC, 2011b). Similarly, ACOG (2007) recommends cesarean delivery for all women with active genital lesions or prodromal symptoms at the time of delivery.

The National Institute for Health and Clinical Excellence (NICE, 2011) declares there is ambiguity regarding the effect of cesarean deliveries on reducing the potential for transmission of neonatal herpes in women with recurrent infections. Similarly, the USPSTF (2005b) declares that there is insufficient evidence to recommend performance of cesarean deliveries in women with active herpes lesions at the time of delivery in order to decrease the incidence of neonatal herpes. A study evaluated by the USPSTF, which was designed to demonstrate the prevention of HSV transmission to neonates through the use of cesarean delivery, provides optimism. Among women who were HSV positive at the time of labor, one case of neonatal herpes was found among 85 cesarean deliveries, compared to 9 cases among 117 vaginal deliveries (Glass et al., 2005). This suggests that cesarean deliveries may in fact be effective at minimizing occurrences of neonatal herpes infections among infants born to mothers with HSV. Nonetheless, additional research is indicated to further investigate the effectiveness of cesarean deliveries at minimizing the outcome of neonatal herpes.

Absence of symptoms. Women without signs or symptoms of genital herpes or its prodrome should be allowed to deliver vaginally (CDC, 2011b). In other words, the CDC (2011b) recommends against prophylactic cesarean delivery in women with no active genital

herpetic lesions at the onset of labor. ACOG (2007) also recommends against cesarean delivery for women with a history of HSV infection yet without active genital lesions during labor.

Pregnancy-Related Procedures

There are various interventions, such as transabdominal procedures and invasive monitoring, that pregnant women often undergo. It is important to review these interventions in the context of pregnant women with genital herpes. Transabdominal procedures, such as chorionic villus sampling, amniocentesis, or percutaneous umbilical cord sampling, may be performed on pregnant women with recurrent infection, even in the presence of herpetic lesions (Horsley, 2008). On the contrary, invasive monitoring, such as with the use of a fetal scalp electrode, significantly increases the risk for intrapartum transmission of neonatal infection (Horsley, 2008). Kriebs (2008) recommends that such invasive procedures be avoided if possible when a mother with HSV is in labor to decrease fetal exposure to vaginal secretions. Anzivino et al. (2009) add that fetal scalp electrode monitoring during labor and vacuum or forceps assisted delivery should only be implemented if necessary. Fetal scalp monitoring may be considered when indicated in a woman with a history of recurrent infection yet who does not have active lesions (Horsley, 2008). Thus, while these interventions may still be considered for use among pregnant women with genital herpes, it is important to weigh the risks and benefits that such measures may have on the neonate.

Education and Counseling

Education and counseling are necessary to prevent sexual and perinatal transmission of HSV (Glass et al., 2005). Many women and their partners enter pregnancy without a clear understanding of what they can do to prevent risk to their infant (Kriebs, 2008). According to the American Sexual Health Association (2014a), the best way to protect one's infant is to be

educated on the facts about HSV and how to protect oneself. Thus, informed educators are necessary to assist the woman and her partner in choosing the best course of action for their pregnancy (Wood, 2011). Handsfield et al. (1998) found that knowledge was low among health care providers, those at risk for genital herpes acquisition, the general public, and even those with herpes themselves regarding incidence, prevalence, transmission, neonatal herpes, and antiviral therapy. Romanowski et al. (2008) found that patients with genital herpes, and their providers, lacked knowledge regarding genital herpes diagnosis, asymptomatic shedding, and risk of transmission, highlighting that the findings of Handsfield et al. remain true. Thus, the CDC suggests that a campaign to better educate health care providers and the general public about genital herpes and its prevention is necessary (Handsfield et al., 1998).

Specific educational messages. There are several important messages to convey to women and their partners in order to decrease sexual and perinatal transmission of genital herpes. The risk of neonatal herpes infection should be explained to each person, including men (CDC, 2011b). Education should emphasize prevention of neonatal herpes by preventing transmission and acquisition of genital herpes among women and their partners. According to the U.S. Department of Health and Human Services' Office on Women's Health (2009) strategies to lower one's risk of acquiring genital herpes include practicing abstinence; having a faithful, sexual relationship with one partner who has tested negative for herpes; and condom use. It is also important for individuals to be knowledgeable on various forms of birth control, including which methods do and do not protect against HSV, as well as the symptoms of genital herpes and actions to take should symptoms develop (Office on Women's Health, 2009). Individuals need to recognize that genital herpes is not prevented by washing the genitals, urinating, or douching after intercourse (CDC, 2013a). Education should stress that the most effective way to prevent

genital herpes is to abstain from intercourse or to only have sexual encounters with an uninfected individual in a monogamous relationship (CDC, 2013a).

If symptoms characteristic of genital herpes develop, one should be instructed to: (1) seek medical attention and treatment immediately; (2) follow the provider's orders and complete all prescribed medication regimens regardless of the disappearance of symptoms; (3) abstain from sexual activity while being treated and while symptoms persist; and (4) tell all sexual partners so they, too, can receive treatment (Office on Women's Health, 2009). If a pregnant woman's partner has genital herpes, she should: (1) get tested to find out if she, too, is infected; (2) avoid sexual activity beginning at the onset of prodromal symptoms, while the partner is being treated or if symptoms persist, and until a few days after the lesions have disappeared; and (3) use condoms correctly and consistently (Office on Women's Health, 2009; ACOG, n.d.). Lesions and secretions should not come into contact with another individual's skin and if this happens, one should wash their hands with soap and water to prevent self-reinfection as well as transmission to others (ACOG, n.d.).

Condom use. The use of condoms is recommended throughout pregnancy to prevent genital herpes transmission, even if the male partner has no active lesions (Straface et al., 2012). Condoms reduce the potential for transmission if used correctly and consistently though areas unprotected by the condom may still become infected (CDC, 2013a). Thus, since condoms are not a complete barrier for the genital region, even regular condom use does not eliminate all possibility of transmission (Kriebs, 2008).

Counseling. Though initial counseling provided at the first visit is advantageous, several patients benefit from learning about the chronic aspects of HSV after the acute illness subsides (CDC, 2011b). Counseling should reflect the fact that, during pregnancy, new HSV infections

carry greater risks for both mother and child than does recurrent shedding, whether or not symptoms are present (Kriebs, 2008). Specifically, women with known recurrent infections should be counseled at the time of delivery about the risks of transmission to the neonate (Money & Steben, 2008). Women need to recognize that even if they have no or rare clinical recurrences, there still exists a small risk of intrapartum transmission (Kriebs, 2008). Corey and Wald (2009) emphasize the need to counsel all women to abstain from unprotected sexual intercourse, including oral-genital contact, in late pregnancy. Pregnant women not known to be infected with genital herpes should be counseled to abstain from intercourse, including oral and vaginal contact, during the third trimester of pregnancy with men who have HSV (CDC, 2011b). Breastfeeding mothers should be instructed not to breastfeed if lesions are present on the breast, including the nipple (ACOG, n.d.). Milk may still be pumped or expressed by hand yet milk that comes into contact with sores while pumping should be discarded (ACOG, n.d.).

Corey and Wald (2009) identify changes in sexual behavior of pregnant women at risk, a universal and low cost strategy, as the key to reducing acquisition of HSV during pregnancy. In order for behavior changes to occur, patients must be knowledgeable on genital herpes, its implications during pregnancy, and the disease's effect on the neonate should perinatal transmission occur. Providers can best care for their patients by guaranteeing that women and their partners receive accurate information about "the transmission and diagnosis of herpes simplex, prevention of neonatal disease, and available management strategies" (Kriebs, 2008, p. 207).

Management Strategies

Several strategies exist to educate pregnant women identified as at risk for acquiring HSV. However, it would prove difficult to target individuals in need of education based solely

on the identified risk factors that increase one's chance of acquiring genital herpes. A population-based study using Washington State's data on neonatal HSV infection indicated that demographic and clinical characteristics could not be used to identify women with high risk of transmitting HSV to their infants (Mark, Kim, Wald, Gardella, & Reed, 2006). This suggests that targeting education toward women at risk for acquiring genital herpes during pregnancy is not likely to be successful, indicating a need to educate the general public. Health care providers play a vital role in educating the general public on a health related issue, such as genital herpes. Studies by Handsfield et al. (1998) and Romanowski et al. (2008) found that knowledge was low among health care providers regarding genital herpes, indicating that health care providers should instead be the target of educational interventions. By educating health care providers, they will become equipped to appropriately counsel and educate their patients on genital herpes and its prevention, particularly during pregnancy. Counseling and promoting sexual health regarding genital herpes among all patients will increase the general public's awareness about genital herpes and its prevention, ultimately decreasing genital herpes acquisition in pregnancy, and minimizing cases of neonatal herpes.

Patient-Physician Gap

According to the American Sexual Health Association (ASHA) and the Herpes Resource Center (HRC), patients are looking for reliable, current information about genital herpes (Alexander & Naisbett, 2002). Clients are seeking information about diagnostic testing, timing and accuracy of tests, and how the tests compare to one another (Alexander & Naisbett, 2002). They want to know about treatment strategies, including self-management, as well as available antiviral therapies, associated advantages and disadvantages, and effectiveness (Alexander & Naisbett, 2002). Patients are particularly concerned about the risk of herpes transmission and

which treatment strategies will prevent or reduce sexual transmission risk (Alexander & Naisbett, 2002).

Among physicians surveyed, the focus seems to be on symptom management with a disregard for the psychological impact of genital herpes (Alexander & Naisbett, 2002). Treatments are based on cost effectiveness and the severity of clinical recurrences, ignoring disease transmission (Alexander & Naisbett, 2002). Physician's attitudes towards genital herpes are alarming as half have no interest in the disease, do not offer any treatment, and are not interested in offering counseling to patients (Alexander & Naisbett, 2002). Therefore, a huge gap has formed between patient and physician perceptions about genital herpes (Alexander & Naisbett, 2002). A more recent article confirms that a gap still exists among health care providers and patients regarding attitudes and perceptions of genital herpes. Romanowski et al. (2008) administered an online survey to family doctors and patients with genital herpes in order to compare and contrast their attitudes and behaviors regarding the disease. According to the survey, doctors felt that they were more proactive and provided more information about genital herpes than was reported by patients (Romanowski et al., 2008). "Bridging the gap between patients and physicians is vital for improving the management of genital herpes" (Alexander, Naisbett, 2002, p. S57). Health care providers need to be better informed to best assist patients and to provide them with the information they are seeking. Knowledge about the disease, diagnosis, and treatment options is necessary to provide patients with accurate and appropriate information and supportive resources, and to help define their options (Alexander & Naisbett, 2002). "This presents opportunities for education and improvement in the management of genital herpes" (Romanowski et al., 2008, p. 51).

Behavior Change for Health Risk Reduction

A telephone survey conducted by Aral, Cates Jr., and Jenkins (1985) investigated whether awareness of the herpes epidemic leads to changes in sexual behavior. Of those surveyed, 45% who perceived themselves to be at risk for acquiring genital herpes expressed they had changed their behavior as a result of this perception (Aral et al., 1985). This data provides optimism regarding behavior change for health risk reduction (Aral et al., 1985). Though conducted in the past, these findings still remain true. Of 38 surveyed participants in a study conducted by Freeman, Zychowicz, Feldman, and Gordon (2012), 43.9% stated that screening alone led them to consider safer sexual practices. This is congruent with the findings of Aral et al. (1985), who found that a screening risk assessment alone led to increased reporting of safer sex practices. These findings suggest that with increased preventive education and counseling on genital herpes from health care providers, transmission of genital herpes and occurrences of neonatal herpes will be further minimized based on patients' behavior changes.

Educational Methods

Numerous interventions to educate health care providers have been proposed and tested throughout the literature.

Meetings. Educational meetings, including courses, conferences, lectures, workshops, seminars, and symposia, are often used for continuing medical education (Forsetlund et al., 2009). A review of eighty-one trials evaluating their effectiveness found that educational meetings, alone or combined with other interventions, can improve professional practice and the accomplishment of treatment goals by patients (Forsetlund et al., 2009). Higher attendance at meetings is linked to greater improvements in professional practice and patient outcomes (Forsetlund et al., 2009). Interactive combined with didactic educational methods are more

effective than either style alone (Forsetlund et al., 2009). Additionally, educational meetings alone are not likely to be effective for altering complex behaviors (Forsetlund et al., 2009).

Printed materials. Printed educational materials are also often used to educate health care professionals. Printed educational materials (PEMs), in the form of research results published in health care journals and printed clinical practice guidelines distributed to health care providers, are widely used to increase knowledge, awareness, attitudes, skills, and professional practice of providers (process outcomes), and also to improve patient health outcomes (Farmer et al., 2008). PEMs can be dispersed to a large number of health care providers at a low cost (Farmer et al., 2008). A review of twenty-three studies found that PEMs alone, when compared to no intervention, may have an advantageous effect on healthcare professional practice (Farmer et al., 2008). There is insufficient evidence and a lack of results to determine whether PEMs, when compared to other interventions, have an impact on patient outcomes (Farmer et al., 2008).

Internet-based modules. The use of web-based learning and educational modules to educate health care providers has also been reviewed. A study was conducted comparing a self-learning web-based educational tool against a traditional on-campus lecture (Morente, Morales-Asencio, & Veredas, 2013). Undergraduate nursing students educated on the topic of pressure ulcer assessment and treatment using the web-based tool showed profoundly higher learning acquisition (Morente et al., 2013). Morente et al. (2013) highlight that during traditional lecture-based education, learners are “passive recipients of knowledge, showing low motivation and interest rates” (p. 2). In addition, there is no guarantee that learners are making the connection between theory and practice (Morente et al., 2013). On the other hand, web-based education allows flexible learning, available at any place and time, and provides immediate feedback (Morente et al., 2013). Web-based learning can also be applied to health care providers. Lehna,

Ramos, Myers, Coffey, and Kirk (2011) studied the effectiveness of a web-based educational module to increase knowledge regarding burn prevention. The 74-slide PowerPoint module proved to be an effective and convenient way to increase burn prevention knowledge immediately (recall) and over time (retention) (Lehna et al., 2011).

With an increase in access to technology in the U.S., Internet use among health care providers is growing (Wutoh, Boren, & Balas, 2004; Cobb, 2004). Wutoh et al. (2004) studied the relationships among Internet-based continuing education, provider's performance, and patient outcomes. Advantages of web-based education include lower costs, convenience, increasingly interactive format, and ability to "complement and reinforce traditional medical teaching" (Wutoh et al., 2004, p. 21). Yet, according to Wutoh et al. (2004), attending meetings remains the desired format for physicians obtaining continuing education in the United States. Several studies were reviewed and it was determined that web-based continuing education programs are just as effective as printed materials or lecture-based education in transferring knowledge to health care providers (Wutoh et al., 2004).

Similarly, Cobb (2004) reviewed studies regarding "practices, preferences, and evaluation of on-line continuing education used by health care professionals" (p. 171). Cobb (2004) also discovered that in-person continuing education is still the preferred and most common format, yet web-based continuing education is becoming increasingly popular. Those who participate in Internet-based continuing education find it to be an effective learning format and are pleased with the experience, yet barriers such as technical difficulties and lack of computer knowledge remain (Cobb, 2004). A more recent study by Cook et al. (2008) shares a consistent point of view regarding the benefits of internet-based learning and its increasing popularity. Cook et al. (2008) reviewed studies of web-based education involving healthcare

professionals and found that Internet-based learning, compared with no intervention, has a consistently positive effect. The effect of web-based instruction compared to non-Internet methods was inconsistent across studies, perhaps due to variation in learners and other characteristics of the educational framework (Cook et al., 2008). Nonetheless, web-based education is linked to favorable outcomes among a variety of learners, contexts, and topics, and seems to have effectiveness similar to traditional methods (Cook et al., 2008).

Each of these strategies exists to educate health care professionals with varying learning styles and education needs. Educational meetings are most effective at improving professional practice and patient outcomes when content is presented in both an interactive and lecture format (Forsetlund et al., 2009). This education method may have the greatest benefit among older health care professionals who lack computer knowledge and prefer the in-person format. Web-based educational modules have also shown significant learning acquisition and are advantageous because of their convenience, low cost, and interactive format (Morente et al., 2013; Wutoh et al., 2004). Web-based learning most likely appeals to the younger generation of health care professionals who are technology savvy and prefer flexible learning opportunities. Printed educational materials (PEMs) are also an option when considering educational strategies for health care professionals. They are beneficial at increasing knowledge, awareness, attitudes, skills, and professional practice of providers (Farmer et al., 2008). PEMs are also useful because they allow review of the educational content following the completion of the educational meeting or web module. The March of Dimes offers educational opportunities for health professionals, including online material, modules, and conferences, which indicates that each of these interventions is applicable to genital herpes educational content (March of Dimes Foundation, 2014). Conclusively, an educational intervention was designed for an in-person

educational meeting, intended to be altered for use in additional educational formats, such as a web-based educational module or printed educational materials. This way, the content will have the most applicability and increase the knowledge of the greatest amount of health care professionals.

Recommendations for Care: Educational Intervention

The educational intervention, Neonatal Herpes Prevention: Management Strategies During Pregnancy, is a 52-slide PowerPoint designed to inform health care professionals about genital herpes, its implications on the pregnant woman and neonate, and strategies for prevention, in order to minimize occurrences of neonatal herpes [see Appendix A, p. 38]. The presentation consists of lecture and interactive formats, as this combination is more effective than either style alone (Forsetlund et al., 2009). It is intended for use as a presentation during face-to-face educational meetings. The instructional format will allow the educator to clearly and concisely convey the material before questions are received from the audience (Price, 2010). The educational content can be applied to various educational formats, such as web-based learning modules or printed educational materials, tailored to providers' diverse learning styles.

The presentation begins with three brief, measureable learning objectives allowing providers to form expectations about what they will gain from the educational meeting (Hoygaard, 2011). Each major section in the PowerPoint is led with an introduction title slide, permitting the learner to recognize and distinguish the content being presented. Interaction designed as "Test Your Knowledge" questions is included throughout the presentation, at the end of major sections. This emphasizes retention of material during the presentation, and serves as completion markers for each major section of the PowerPoint.

The educational content opens by explaining why genital herpes is important in an attempt to capture the learners' attention (Price, 2010). Evidence is presented to further explain the need for health care providers to receive education on the topic. The presentation progresses through brief content regarding genital herpes: what it is, who is at risk for acquiring it, how it is transmitted, signs and symptoms, existing infection statuses, diagnostic testing, and treatment with antiviral therapy. This material is included to provide general information about genital herpes necessary to ensure health care providers are informed when counseling patients. The focus of the presentation shifts to genital herpes during pregnancy, including risk factors and characteristics of infection, and is followed by neonatal herpes, including what it is, how it is transmitted from mother to neonate, and prevention measures. Prevention techniques include assessment, screening, antiviral therapy, cesarean delivery, and education and counseling. The presentation concludes with two take home messages of importance and time is allotted for questions (Hoygaard, 2011).

The PowerPoint design consists of text and background colors that provide a clear contrast and make the presentation easy to visualize (Price, 2010). A basic, large size font was chosen to further permit easy visualization. Simple transitions between slides are used in an attempt to keep the presentation timely and efficient (Price, 2010). Pictures are incorporated throughout the presentation to make effective use of space while minimizing distractions. Pictures are also included in an attempt to provide the learner with an additional tool to assist in retention and recall of material.

The envisioned use for the educational intervention is as a continuing education course, specifically among health care providers caring for pregnant women or women of childbearing age. The goal is to inform professionals caring for this population about genital herpes and its

impact on the pregnant woman and neonate. The presentation is designed to give providers the knowledge necessary to counsel and educate their patients, the general public, regarding this disease. The expected outcome is behavior changes among those who perceive themselves at risk in order to prevent the acquisition of genital herpes, especially during pregnancy. Additionally, women and their partners will have a better understanding of how to manage genital herpes during pregnancy in order to reduce incidences of neonatal herpes.

Next Steps: Implications for Future Practice

Recommendations for the future are made to enhance nursing practice in the disease management and prevention of genital herpes. As previously mentioned, the educational intervention was designed for adaptation to various educational formats, such as a web-based learning module, and printed educational materials. This would be the next step in continuation of this project in order to meet providers' unique learning needs and to ensure high applicability of the presentation. Prior to implementation, the educational content needs to be reviewed for applicability and use in the practice setting among providers. Additionally, a pretest and posttest should be designed in order to determine the presentation's effectiveness at imparting knowledge onto health care professionals.

Subsequent Presentation

The educational intervention includes content to educate health care providers on genital herpes and its occurrence in pregnancy, neonatal herpes, and prevention strategies. The purpose of the educational intervention is to create informed health care providers, equipped to counsel patients on the prevention of genital herpes. While the focus of the intervention is on prevention, new cases of neonatal herpes are still occurring. Thus, providers also need to become educated regarding the phenomenon of neonatal herpes, how to recognize it, and appropriate measures to

take when infant exposure occurs. A similar presentation designed for adaption to varying educational formats can be used to further the established work, and can serve as a subsequent presentation in the continuing education course.

Prospective Research

Additional research is indicated on the topics of genital herpes during pregnancy, and neonatal herpes. The review of literature revealed varying guidelines recommended for the management of genital herpes in pregnancy. However, several questions remain regarding the effectiveness of these interventions in preventing the outcome of neonatal herpes. With additional research on the topics, authors and organizations can reach an agreement regarding the best way to manage genital herpes in pregnancy in order to decrease occurrences of neonatal herpes. Universal standards of nursing care can then be created regarding the optimal way to prevent neonatal herpes infections.

Conclusion

Genital herpes is the most common sexually transmitted disease (STD) among the adult female population in the United States (Kriebs, 2008). Proper management of genital herpes among pregnant women and women of childbearing age, and their partners, is necessary to prevent the outcome of neonatal herpes. Knowledge regarding genital herpes is low among health care providers, suggesting that infected individuals, their partners, and those at risk for acquisition are receiving suboptimal and insufficient management and prevention guidance (Handsfield et al., 1998). Thus, as recommended by the CDC, a campaign to better educate health care providers and the general public about genital herpes and its prevention is necessary (Handsfield et al., 1998). An educational PowerPoint, Neonatal Herpes Prevention: Management Strategies During Pregnancy was designed for use in a face-to-face educational meeting, and

intended to be adapted to various educational formats to reach a high number of providers with different learning preferences. The goal of the educational intervention is to create informed health care providers, equipped with the knowledge necessary to counsel and educate their patients on genital herpes and its prevention. By ensuring that women and their partners receive accurate information necessary to manage the disease, providers are enabling expectant mothers to make informed decisions concerning their pregnancy and birth. The expected outcome is a reduction in cases of neonatal herpes as a result of increased knowledge among providers, patients and the general public, behavioral changes regarding sex practices, and better management of genital herpes.

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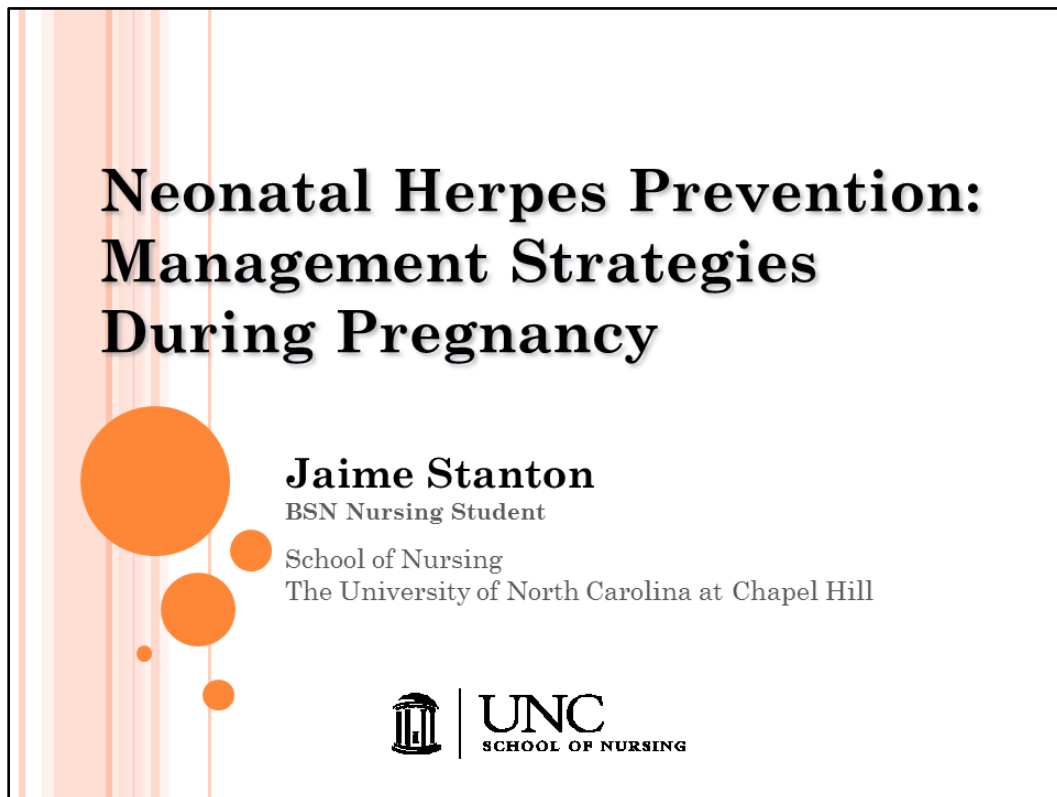
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Appendix A:

Neonatal Herpes Prevention: Management Strategies During Pregnancy

Please open the accompanying PowerPoint presentation or view the PowerPoint slides below.



LEARNING OBJECTIVES

- Identify characteristics of genital herpes, including clinical manifestations and transmission.
- Recognize the occurrence of:
 - Genital herpes during pregnancy
 - Neonatal herpes
- Describe prevention strategies for neonatal herpes.



GENITAL HERPES



WHY IS GENITAL HERPES IMPORTANT?

- Most common sexually transmitted disease (STD) among the adult female population in the U.S
- Risk of maternal transmission to the newborn
- Approximately 1,500-2,000 new cases of neonatal infection diagnosed yearly
- Untreated neonatal infection = mortality rate of 60%
 - Even with prompt treatment survivors experience disability.
- **Need for preventive action!**



RESEARCHERS SAY...

- **Knowledge low among health care providers**, those at risk, general public, those with herpes:
 - Regarding diagnosis, transmission, neonatal herpes, antiviral therapy
- Those infected, their sex partners, and persons at risk:
 - **Receive suboptimal, insufficient health care information and prevention guidance**
- Prevention strategy recommended by CDC:
 - **Campaign to better educate health care providers** and general public about genital herpes and prevention

(Handsfield, Stone, & Graber, 1998)
(Romanowski, Zdanowicz, & Owens, 2008)



WHAT PATIENTS WANT TO KNOW

- Diagnostic testing
 - Timing and accuracy of tests
 - How tests compare to one another
- Treatment strategies, including self-management & available antiviral therapies
 - Advantages and disadvantages
 - Effectiveness
- Risk of transmission
 - Which treatment strategies will prevent/reduce risk?

(Alexander & Naisbett, 2002)



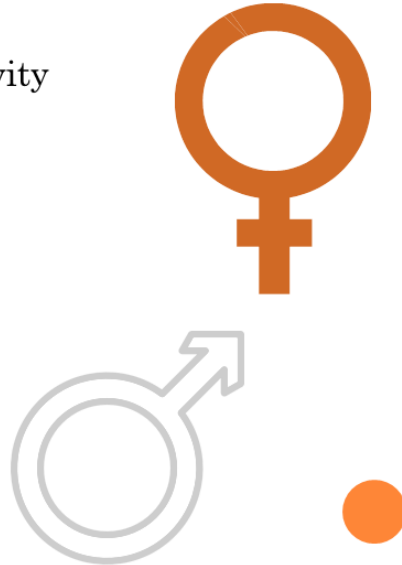
WHAT IS GENITAL HERPES?

- Caused by herpes simplex virus type 1 (HSV-1) or herpes simplex virus type 2 (HSV-2)
 - Members of broad group of DNA viruses
- Transmission: Epithelial mucosal cells & skin breaks
- Lies dormant in nerve tissues in **latent stage**
 - Allows virus to cause disease recurrences over entirety of individual's life
- No cure
 - Virus remains in body
 - Intermittent viral reactivation with or without clinical symptoms (asymptomatic viral shedding) may occur.



RISK FOR ACQUISITION

- Females
- Increasing years of sexual activity
- Number of lifetime partners
- Past infection with STD's
- Less education
- Poverty
- Cocaine use



TRANSMISSION

- Through direct contact with lesions
- Typically during sexual activity
- Can occur if a sore is not present
 - Viral shedding occurs during periods of active outbreaks and when no symptoms are present
- By those unaware they have the infection, or are asymptomatic when transmission occurs




SIGNS AND SYMPTOMS

- Lesions appear 2-14 days after exposure
 - Small, tender, fluid-filled vesicles on genitals, buttocks, or other areas
 - Persist for 2-4 weeks without antiviral therapy
- Other symptoms may include:
 - Intense pain
 - Dysuria
 - Itching
 - Lymphadenopathy
 - Myalgia
 - Fever
 - Headache
 - Nausea
 - Malaise


THREE STATUSES OF INFECTION

- **Primary:** Initial exposure to HSV
 - Antibodies do not exist at time of infection
 - Most significant HSV infection during pregnancy
 - Rates of neonatal herpes as high as 50%
- **Non-primary first-episode:** Individual with preexisting antibodies to either HSV-1 or HSV-2 experiences a first episode with opposite HSV type
- **Recurrent:** Infection in presence of preexisting antibodies against same HSV type
 - Symptomatic or asymptomatic
 - Transplacental antibodies decrease risk of transmission
 - Outbreak often preceded by a prodrome:
 - Individual feels pain in lower back, buttocks, thighs, or knees

DIAGNOSTIC TESTING

- Polymerase Chain Reaction: Looks for pieces of viruses DNA in person's blood
 - Rapid and accurate
 - Identifies viral shedding in presence or absence of lesions
 - Distinguishes HSV-1 from HSV-2
 - Viral culture: Fluid collection from intact blisters
 - Most accurate within 48 hours after appearance of lesions
 - Results available within a week of culture date
 - Serology blood testing: Detects previous HSV infection through presence of antibodies in asymptomatic individuals
- 

APPROVED ANTIVIRAL MEDICATIONS

- Acyclovir, famciclovir, valacyclovir
 - Inhibit viral replication in cells infected with HSV
 - Minimize length of outbreak and reduce discomfort
 - Daily use decreases transmission risk in those experiencing frequent outbreaks.
 - Primary infection: Prolonged treatment regimen
 - 10-day course of oral antiviral medication
 - Antibodies to reduce clinical symptoms not yet established
 - Recurrent infection: Shorter antiviral therapy course
- 

TEST YOUR KNOWLEDGE

Signs and symptoms of genital herpes include:

- A. Fluid-filled vesicles on the genitals, dysuria, itching
- B. Painless, flesh-colored growths on the genitals
- C. Small, painless open sore on the genitals
- D. Foul-smelling vaginal discharge, lower abdominal pain



TEST YOUR KNOWLEDGE

Genital herpes is primarily transmitted through contact with an infected person's:

- A. Blood
- B. Lesions
- C. Feces
- D. Urine



GENITAL HERPES: PREGNANCY



WHO IS AT RISK?

- Maternal age ≤ 21 years
- Differing HSV status among partners (serodiscordant)
- Partner with oral herpes
- New partner within past year

**A study on neonatal HSV infection indicated that:*

- Demographic & clinical characteristics
 - Could not be used to identify women at high risk of transmitting HSV to their infants
- **Everyone should be educated on prevention of genital herpes acquisition!**

(Mark, Kim, Wald, Gardella, & Reed, 2006)

PRIMARY INFECTION: PREGNANCY

- Less prevalent than recurrent infection
- Significantly higher transmission rate
- Poses greater threats to mother and child
- Leads to high rates of spontaneous abortion and stillbirth in first trimester
- May cause premature birth and low birth weight later in pregnancy
- **Emphasis is placed on preventing:**
 - Acquisition of primary infection during pregnancy
 - Transmission from mother with primary infection

NEONATAL HERPES



WHAT IS NEONATAL HERPES?

- Infection in a newborn in the first 28 days of life



- Delayed diagnosis associated with high mortality
- Even with adequate treatment, permanent consequences such as cerebral palsy and developmental delays may still occur.



NEONATAL HERPES: TRANSMISSION

- High among women who:
 - Are seronegative
 - Lack antibodies to suppress viral replication prior to labor
 - Acquire genital herpes close to time of delivery
 - Are asymptomatic with no known history of genital herpes



We must educate all patients!



TRANSMISSION: **MOTHER to BABY**

- **Intrapartum:** baby passes through mother's infected birth canal
 - Most frequent (80-90%)
 - Risk lessened when protective maternal antibodies cross placenta and exist in fetus
- **Intrauterine:** occur without baby passing through vagina, i.e. amniotic sac breaks few hours before birth
 - Very rare (1/100,000) due to acquisition of virus in utero
- **Postnatal:** infant contact with infected parents or health care providers
 - 5-15% of neonatal herpes infections

TEST YOUR KNOWLEDGE

Demographic and clinical characteristics allow identification of women at high risk of transmitting HSV to their infants, permitting education targeted toward those at risk.

- A. True
- B. False



TEST YOUR KNOWLEDGE

Neonatal herpes transmission is highest among:

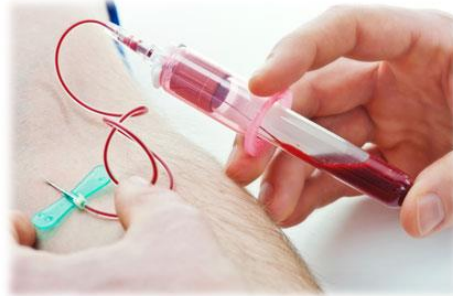
- A. Women who are seronegative
- B. Women acquiring genital herpes close to time of delivery
- C. Women who are asymptomatic
- D. All of the above

NEONATAL HERPES: PREVENTION



NEONATAL HERPES: PREVENTION

- Relies on preventing:
 - Acquisition of genital herpes in late pregnancy
 - Infant exposure to herpetic lesions at time of delivery
- How can we do this?
 - Assessment
 - Screening
 - Antiviral therapy
 - Cesarean delivery
 - Education
 - Counseling



ASSESSMENT

- **Who?** All women
- **When?** Early in pregnancy, At first prenatal visit, At onset of labor
- **What?** History of genital herpes infection (including recent & prodromal symptoms), Partner history, Perineum examination
- **Screening via assessment & physical examination alone is unreliable.**
 - Viral shedding without clinically visible lesions is common.

RECOMMENDATIONS: SCREENING PREGNANT WOMEN

- USPSTF and ACOG **recommend against** screening asymptomatic women at any time during pregnancy.
- CDC **recommends** testing pregnant women who have:
 - Symptoms indicative of genital herpes
 - Partner with, or symptoms indicative of, genital herpes
- Women acquiring primary infection in first two trimesters:
 - Sequential viral cultures on genital secretions
 - Beginning at 32 weeks gestation
- **Screening doesn't detect those with highest risk of transmission to infant**
 - Women acquiring primary infection are initially seronegative.

ANTIVIRAL USE DURING PREGNANCY: IS IT SAFE?

- Increased risk for major birth defects **not found** in pregnant women being treated with acyclovir during first trimester
- Acyclovir may be administered to pregnant women:
 - Orally for primary infection or severe recurrent infection
 - Intravenously for severe infection
- Data pertaining to prenatal exposure to valacyclovir and famciclovir does not provide useful information on pregnancy outcomes.
- All three drugs labeled category B drugs:
 - No teratogenic effects discovered in animal studies
 - No or limited studies on humans available

ANTIVIRAL SUPPRESSION: PREGNANT WOMEN WITH PRIMARY INFECTION

- Should receive antiviral therapy at initial outbreak, regardless of time of occurrence during pregnancy

*** We are often unaware of the presence of primary infection so antiviral therapy may not have useful implications for this population.**

ANTIVIRAL SUPPRESSION: PREGNANT WOMEN WITH RECURRENT INFECTION

- Acyclovir or valacyclovir at 36 weeks' gestation until term:
 - Decreases risk of viral shedding during delivery
 - Decreases need for cesarean delivery



CESAREAN DELIVERY

- Women with NO active genital herpes lesions or its prodrome at the onset of labor:
 - CDC **does not recommend** cesarean delivery
- Women WITH active genital herpes lesions (or early symptoms) at time of delivery:
 - CDC and ACOG identify **cesarean delivery as the current standard**



PREGNANCY-RELATED PROCEDURES

- Transabdominal invasive procedures
 - May be performed on pregnant women with recurrent infection, even in presence of lesions
 - Chorionic villus sampling
 - Amniocentesis
 - Percutaneous umbilical cord sampling
- Invasive monitoring (fetal scalp electrode)
 - Increases risk for intrapartum transmission
 - Avoid to decrease fetal exposure to vaginal secretions
- Vacuum or forceps should only be used if necessary

TEST YOUR KNOWLEDGE

Recommendations for assessment include:

- A. All women, at the initial prenatal visit only
- B. All women, at the onset of labor only
- C. All women, at the initial prenatal visit & the onset of labor



TEST YOUR KNOWLEDGE

The CDC recommends:

- A. Screening pregnant women who have symptoms indicative of genital herpes
- B. Cesarean delivery in the presence of active genital lesions
- C. Both A & B



PREVENTION: EDUCATION & COUNSELING



EDUCATION

- Best way to protect one's infant: be educated on the facts of genital herpes and how to protect oneself
 - **Informed educators are necessary!**
- Risk of neonatal herpes infection should be explained to each person, including men.
- Education of those affected and their sexual partners assists individuals to:
 - Cope with recurrent symptoms
 - Prevent sexual & perinatal transmission

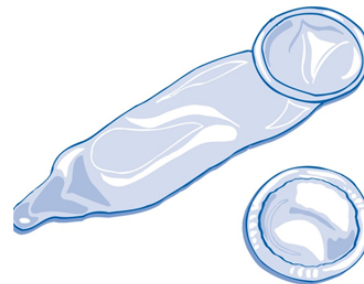
SPECIFIC EDUCATIONAL MESSAGES

- To lower one's risk of acquiring genital herpes:
 - Practice abstinence
 - Have a faithful, sexual relationship with one partner who has tested negative for genital herpes
 - Condom use
- Individuals should be knowledgeable on:
 - Various forms of birth control
 - Which methods do and do not protect against genital herpes
 - Symptoms of genital herpes
 - Actions to take should symptoms develop
- Genital herpes is not prevented by washing the genitals, urinating, or douching after intercourse.



CONDOMS

- Reduce the potential for transmission if used correctly and consistently
- Areas unprotected may still become infected
- Are not a complete barrier for the genital region
 - Even regular condom use does not eliminate all possibility of transmission.



“I think I have genital herpes...”

- Instruct your patient to **seek medical attention and treatment immediately** if symptoms characteristic of genital herpes develop.
- Follow provider’s treatment orders.
- Complete all prescribed medication regardless of disappearance of symptoms.
- Abstain from sexual activity:
 - While being treated
 - While symptoms persist
- Tell all sexual partners so they can receive treatment.

“My partner has genital herpes...”

- Instruct patient to get tested to find out infection status
- Avoid sexual intercourse:
 - While partner is being treated
 - Beginning at onset of prodromal symptoms
 - Until a few days after lesions have disappeared
- Lesions and secretions should not come in contact with another’s skin.
- Use condoms correctly & consistently throughout pregnancy even if male partner has no active lesions.

COUNSELING: WOMEN & THEIR PARTNERS

- Initial counseling at first visit is beneficial
 - Many patients benefit from learning about chronic aspects of genital herpes after acute illness subsides.
- Counseling should convey that, during pregnancy, new infections carry greater risks for both mother and child.
- Abstain from unprotected sexual intercourse, including oral-genital contact, in late pregnancy.



COUNSELING: PREGNANT WOMEN WITHOUT INFECTION

- Abstain from intercourse, including oral and vaginal contact, during the third trimester of pregnancy with men who have genital herpes.

*** Changes in sexual behavior of pregnant women at risk, a universal and low cost strategy, are key to reduce acquisition of HSV during pregnancy.**



COUNSELING: PREGNANT WOMEN WITH INFECTION

- About risks of transmission to neonate
 - Recognize that risk of transmission exists, even in presence of no or rare clinical recurrences
- Breastfeeding mothers: instruct not to breastfeed if lesions are present on breast, including nipple
 - Milk may still be pumped or expressed by hand
 - Discard milk coming into contact while pumping



THE MOST EFFECTIVE WAY TO PREVENT GENITAL HERPES...

- Is to abstain from intercourse or to only have sexual encounters with an uninfected individual in a monogamous relationship



TEST YOUR KNOWLEDGE

Counseling should reflect the fact that:

- A. A lesion on the breast cannot transmit herpes to the infant
- B. Unprotected sexual intercourse is safe throughout pregnancy
- C. During pregnancy, new infections carry greater risks for mother and child
- D. Low risk of transmission exists with new infections acquired late in pregnancy



TEST YOUR KNOWLEDGE

The most effective way to prevent genital herpes is through condom use.

- A. True
- B. False



TAKE HOME MESSAGES

- You can best care for your patients by ensuring that women and partners receive accurate information about:
 - Transmission and diagnosis of genital herpes
 - Prevention of neonatal disease
 - Available management strategies
- Expected outcome of education and counseling on genital herpes:
 - Rewarding perinatal experience
 - Enabling expectant mother to make best decision concerning pregnancy and birth

QUESTIONS?



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